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A RAND NOTE

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INCENTIVES AND INSURANCE IN INTERNATIONAL
FINANCIAL MARKETS

Daniel F. Kohler

June 1984

N-2117-USDP

Prepared for

The Office of the Under Secretary of Defense
for Policy

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This Note lays the theoretical groundwork for estimates of resource flows to the Communist World resulting from Western trade policy. Section II considers the strategic behavior of borrowers and lenders and the consequences of this behavior for the probability of a loss occurring. Section III analyzes the insured lender's incentives more closely, including self-insured lenders, external insurance, and lender-specific risks and risk perceptions. The last section considers the policy implications of the findings, especially with respect to Western loans to the East. Originator-supplied

Keywords include: International trade, Economics, Finance, and U.S.S.R.

A

PREFACE

This Note is one in a series prepared for the Office of the Under Secretary of Defense for Policy. It is part of Rand's research program on international economic policy, and should be of interest to policymakers concerned with international resource flows. It lays the theoretical groundwork for estimates of resource flows to the Communist World resulting from Western trade policy, and of the extent to which these transfers may directly or indirectly affect military spending in the Soviet Union.

Other Rand Publications within the same project include:

- *Subsidization of East-West Trade Through Credit Insurance and Loan Guarantee*, by Daniel F. Kohler and Kip T. Fisher, N-1951-USDP, January 1983.

- *The Effects of Export Credit Subsidies on Western Exports to the Soviet Bloc*, by Keith Crane and Daniel F. Kohler, N-2106-USDP, June 1984.

- *Export Subsidies as Instruments of Economic and Foreign Policy*, by Stephen W. Salant, N-2120-USDP, June 1984.

- *Economic Costs and Benefits of Subsidizing Western Credits to the East*, by Daniel F. Kohler, R-3129-USDP, June 1984.

These reports should help to inform the current debate on international export competition and the problems of excessive debt burdens by some borrowing countries (or excessive lending by Western governments and banks).

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SUMMARY

International credit transactions differ from domestic ones in that lender and borrowers reside under different jurisdictions. This makes pressing a claim, such as demanding repayment of principal and interest, particularly difficult. Especially if the borrower is a foreign government, it is often impossible for the lender to obtain assistance from the legal authorities in his attempt to force the borrower to honor the loan contract. →(to p 1473 B)

The first part of this Note investigates the incentives that borrowers in such a market have for honoring their commitments. Under what circumstances are they likely to see it in their interest to repay a loan as scheduled, and under what circumstances are they likely to refuse repayment, or to seek a renegotiation of their loan and repayment terms.

Not surprisingly, this decision depends crucially on how the borrower expects the lender to react. If a lender is likely to force the borrower into default, and to invoke sanctions that can hurt, the borrower is less inclined to refuse payment and to seek a renegotiation of his repayment terms. However, if the lender is likely to agree to a rescheduling at favorable rates, the borrower may see it in his interest to postpone payment.

Unfortunately for the lenders, it is almost always in their interest to reschedule, rather than to force a default. Borrowers are aware of this when they make their decisions. The result is that practically any borrower, faced with difficulties, can refuse payment almost with impunity. It is most unlikely that a lender will pull the plug on him.

There are a number of strategic moves that a lender can undertake to help convince the borrower to pay on time. If a lender is able to bind himself to forcing a default in case of nonpayment by the borrower, rather than agree to a rescheduling, then the borrower has much stronger incentives to repay. This is especially true if the sanctions imposed in case of a default are very severe.

If the same lender faces a succession of borrowers, or faces the same borrower repeatedly, he may have opportunities to acquire a reputation as a lender who is likely to be hard-nosed with delinquent borrowers. Indeed, his incentives for agreeing to a rescheduling are much reduced. If he agrees to a rescheduling for any one of his borrowers, he sends a signal to all borrowers whose loans become due later that he is willing to discuss reschedulings. Accordingly, more borrowers will be tempted to seek this benefit.

Many governments of Western countries support their exporters by providing them with low cost insurance and guarantees against nonpayment by foreign borrowers. The second part of this Note investigates how such policies affect the lender's incentives to take care, to screen his borrowers carefully, and to undertake the necessary steps to insure repayment.

Insurance coverage can be a substitute for care (self-insurance, self-protection) by the insured. If insurance is available, people take less care, and losses are larger. If insurance is sold at actuarially fair rates, these higher losses are justified by the benefits that accrue to risk averse lenders who have an opportunity to insure their risks. However, if insurance is subsidized, even risk neutral lenders will start substituting insurance for care, and the losses are increased above the social optimum. These losses are direct transfers of resources to the borrower. If the borrower is a strategic adversary, such as the Soviet Union and its allies, such resource transfers are particularly troublesome. If the insurance was sold at actuarially fair rates, these resource transfers might be partially offset by the utility gains of the individuals insured. But since the insurance and guarantees are provided by the Western governments at subsidized rates, additional social costs are imposed, without any additional utility gains.

The direct social costs of providing subsidized credit risk insurance to lenders lending to the Eastern Bloc are thus:

- Care taken by lenders is less than the socially optimal amount.
- Total losses incured are larger than is socially optimal.

- More resources are transferred to the Eastern Bloc than in the absence of subsidized insurance.

The social costs are also increased indirectly. If the Soviet Union and its allies are able to devote more resources to their military buildup, thanks to these transfers from the West, the West, in turn, might be forced to provide more for its own defense. Furthermore, this subsidy, like most subsidies, leads to a misallocation of our domestic resources and thus depresses our productive capacity.

ACKNOWLEDGMENTS

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CONTENTS

I. INTRODUCTION

International financial markets have a number of characteristics that distinguish them from the domestic credit market. Similarly, insurance offered to lenders in these markets, whether it is offered by private companies or through a government institution such as the Export-Import Bank of the United States (EXIM Bank), is markedly different from other forms of insurance. This Note will analyze the implications of these special characteristics for government policy in the field of export financing.

The most fundamental way in which international financial markets differ from domestic ones is in the absence of a legal force which could enforce contracts. If a borrower in the United States defaults on a loan from a U.S. bank, the bank, with the assistance of the government, is entitled to seize the borrower's assets. But in international lending, the borrower's assets are usually under foreign jurisdiction, and it is often difficult to obtain the assistance of the foreign government in an attempt to enforce a contract. If the borrower is the foreign government itself, it is usually impossible. .

This Note concentrates on borrowing by foreign governments, so-called sovereign borrowing. This sort of contract would only be enforceable by a supranational government. The absence of such an authority makes these contracts essentially unenforceable.

Another characteristic of sovereign lending is its considerable size. The sums involved are definitely nonmarginal. Undeniably, this must lead to some modifications of the borrower-lender relationship, which is best captured in the popular saying: "If you owe the bank a million dollars, the bank owns you; if you owe the bank a billion dollars, you own the bank." The sums owed by some sovereign borrowers go into the tens of billions of dollars.

Countries, unlike businesses or people, do not die. Even if a government falls, the successor government usually assumes the responsibilities of its predecessor. This implies that the analysis cannot imply a final period. Lending and borrowing in international

financial markets is a perpetual process, which renews itself constantly.

One characteristic which may also apply to domestic financial markets, but which is definitely more pronounced in the international field, is asymmetry of information. It is often difficult, if not impossible, for a lender to obtain all the information pertaining to the borrower's ability (and willingness!) to service a loan. This gives rise to strategic behavior on both sides, resulting in increased costs to the borrower and increased risks of loss to the lender.

The risk of nonpayment in international sovereign borrowing is usually called "political risk". The precise definition of political risk varies, and the term does not apply only to sovereign borrowing. For the purposes of this Note, political risk is simply defined as the risk of not receiving repayment of a loan made to a foreign government, regardless of whether the government is unable or unwilling to make the payment. This definition is by no means the broadest--some definitions even include the risks of natural disasters (OECD, 1982).

The rationale for including government inability to pay in political risk rests on the presumed policy-making authority of a government. Many countries which are unable to service their debts are in that situation because of clearly identifiable policy choices. They may have borrowed excessively, deceived themselves and their lenders as to the carrying capacity of their economies, and/or harmed their ability to earn foreign exchange through bad exchange rate policies and other policy mistakes. Their unwillingness to make policy decisions which would enable them to service their debts may be politically motivated.

Mexico and Argentina provide two good examples of this. Since the domestic policy changes necessary to reestablish a country's ability to meet its financial obligations are painful to large segments of the population, they are usually not very popular. All the civilian candidates in the recent Argentine elections were under pressure from populist groups to renounce the country's foreign debt. In Mexico labor unions have called for a general strike to protest the austerity measures undertaken by the central government.

This does not imply that random events have no influence on a country's ability to service a loan. But the distinction between ability to repay and willingness to repay is rather artificial. The analysis presented here concentrates on the borrowing country's decision whether or not to service the debt, and to follow policies which will enable it to do so.

Ignoring "exogenous" events in this manner has costs associated with it. It is possible, for example, that some sorts of exogenous risks are better borne by one or another government. This question of efficient allocation of risks to different agents is not addressed here.

In the international financial markets there are a number of private and public companies which offer insurance against the political risks of nonpayment. In the United States, private companies write about one third to one half in value terms of all the political risk insurance policies. The official insurers are the EXIM Bank and the Department of Agriculture Commodity Credit Corporation (CCC).

There are some differences in the way in which these different agents conduct their business. For example, some official insurers require that the borrower be informed of the existence of the policy, while private companies strictly forbid informing the borrower. Other differences concern the self-insurance portion of the policies that are written (i.e., the extent of insurance coverage) and the costs. Private companies typically differentiate their rates for different borrowers and lenders, while the official agencies apply a uniform rate.[1]

In one essential respect, however, both types of insurers follow the same pattern. In case of nonpayment, the insurers purchase the loan paper from the lender, and the borrower now owes his repayments to the insurer. From the borrower's point of view, the insured international credit market is simply a special case of the market where lenders carry the risks themselves. The distinction matters to the borrower only if he has reason to believe that in case of nonpayment he will be treated differently by an insurer than by a lender.

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[1]For a more detailed description of how the political insurance business operates, see Kohler and Fisher, 1983.

The next section will consider the strategic behavior of borrowers and lenders. The discussion is framed in terms of a "lender" who carries the political risks himself. If the lender is insured, and the borrower is aware of this fact, then the lender's role would be played by the insurer, but the strategic game as such would remain essentially unchanged. This section assumes that lenders and insurers defend identical interests vis-a-vis the borrower.

Section III will analyse the insured lender's incentives more closely. Even under insurance it is the lender and not the insurance company who deals with the borrower. (As far as direct loans by the EXIM-Bank are concerned, it can be viewed as a lender who carries his own risks.) But an insured lender does not have the same incentives to minimize losses as does an uninsured lender.[2] As a result, losses will be larger overall.

The insurance and guarantees provided by the official insurance agencies are probably subsidized; the fees and premiums they collect do not cover their full costs. (Kohler and Fisher, 1983; Kohler, 1984). If this insurance was provided at cost covering rates it would serve the socially beneficial purpose of providing risk-averse lenders with an opportunity to transfer the risks to risk-neutral insurers. But subsidized insurance imposes additional social costs, primarily through its incentives to all lenders, even risk-neutral ones, to substitute insurance for care. This results in larger loan losses than are socially optimal.

The last section, "Summary and Conclusions", considers the policy implications of the findings, especially with respect to Western loans to the East. In this case there are some additional considerations which reinforce the conclusion that providing subsidized insurance and guarantees against political risks on credits to sovereign lenders is bad public policy. The increased loan losses caused by subsidized insurance are a direct transfer to the East. If the East chooses to invest these resources in ways detrimental to the West (e.g., in an

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[2] It is not always true that insured lenders have smaller incentives to avoid losses than uninsured ones. However, for the simple kinds of insurance contracts considered here, this standard "moral hazard" result holds.

increased military buildup), the West's welfare losses could be
compounded by the East's welfare gains.

II. STRATEGIC BEHAVIOR BY LENDERS AND BORROWERS

A SINGLE PERIOD STRATEGIC GAME

This subsection treats the lender's and borrower's decisions on how to deal with repayment difficulties as a single period strategic game where both players have the same information. The first move is up to the borrower, who must decide whether to make a scheduled repayment or not. The lender has to react only when and if the borrower decides not to make the payment. The next subsection shall consider anticipatory moves by the lender and extend the analysis to repeated games.

The Lender's Options in a Single Period Game

Consider a lender engaged in the business of extending loans to foreign countries. If everything goes as agreed upon, the lender will, after a specific time, receive repayments amounting to the face value of the original loan plus interest. Call this repayment R. However, it is also possible that he receives only a fraction, possibly zero, of the scheduled repayment.[1] What recourse does he have under these circumstances to induce the foreign borrower to honor his obligation?

One drastic action would be to declare the borrower in default, and to seize whatever assets can be seized. In international loans, the return to the lender is typically very small. There are very few assets that can be seized. Furthermore, a default is likely to trigger numerous cross-default clauses in loan contracts held by other lenders, setting off a mad scramble for the few assets that can be seized. Calling a default may also touch off costly litigation. In sum, the net return to bankruptcy for the lender is typically only a small fraction, say b, of the actual repayment.

There is another reason why lenders shy away from declaring a sovereign borrower in default. The individuals making such decisions, i.e., the managers of large international banks, have a somewhat different set of incentives than the stockholders. What matters to a

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[1] Without loss of generality R can be defined such that the lender receives either all or none of it.

stockholder is whether the bank receives the money or not, and not
whether the borrower is formally declared bankrupt or not. But to a
manager, the formal declaration of bankruptcy makes a big difference.
As long as a borrower is not declared bankrupt, the manager of the
lending institution is justified in carrying this loan as an asset on
the books. Not having to write off bad loans quite yet improves the
apparent profit figures and makes the manager's performance look better
than it actually is, at least temporarily. Ultimately, of course,
losses will be recognized as such. By then, the management may have
changed. These principal-agent problems are not formally considered
here.

Incidentally, managers of large international banks are not the
only ones with a strong aversion to writing off bad loans. The same
holds true for managers of official credit and insurance agencies. The
EXIM Bank, for example, rarely writes off a bad loan. The delinquent
loans still carried as assets on the books of the EXIM Bank include
loans made to Cuba and China prior to the incumbency of their current
governments. In FY 1982, only $32 million of a total delinquent balance
of $1.37 billion were written off. In FY 1981 no loans were written off
(EXIM Bank, 1983).[2]

It is understandable, therefore, that lenders tend to seek a more
palatable alternative to forcing a default. This alternative usually
takes the form of a rescheduling. In a rescheduling, lenders and
borrowers agree to refinance the loan, usually at a higher interest
rate. The specific terms of the rescheduling are subject to
negotiation, which might extend over a considerable period. Lenders
usually agree to a grace period, during which the borrower has to pay
interest only, and sometimes they even extend new loans.

Let d represent the effective interest rate at which the payment R
is being rescheduled. Term structure, grace periods, and other
components of a rescheduling agreement usually lower the effective
interest rate below the nominal interest rate given in the rescheduling
terms. A rescheduling can thus be effectively described as an agreement
between borrower and lender to replace a payment of R due now with a

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[2] Writing off or discounting bad loans is necessary to properly
reflect the financial condition of a business. If bad loans are not
written off, profits are overestimated. Writing off bad loans in no way
diminishes the borrower's obligations as he still owes the full amount.

payment of (1+d) R due in the future. To determine the value of this future payment to the lender it has to be discounted to the present and weighed by the probability of actually receiving the rescheduled payment. Let ρR (0<ρ<1) represent the expected present value of rescheduling the repayment R. Assuming the rescheduling to be for one period only does not involve a loss of generality, since grace periods and other terms can be represented in the rescheduling terms d. Under this simplifying assumption:

$$\rho R = (1-w)(1+d)R/(1+r) \qquad (1)$$

where w is a measure of risk[3] representing the probability of not receiving a fraction of the rescheduled payment, and r is the risk-free interest rate. Lenders are assumed to be risk-neutral and the possibility of multiple repayments is ignored to keep the algebra simple.

The rescheduling terms d are negotiated between the lender and the borrower. The hardest terms that the lender can hope for are those that equate the right-hand side of (1) to R. If d was higher, the borrower could always borrow R from another lender at an interest rate that equates the expected future repayments, adjusted for risk, to R and pay off the first lender. It follows that a lender will prefer being repaid to having to agree to a rescheduling.

But compared to a default, a rescheduling offers numerous advantages to the lender, i.e., b<ρ. One reason for this is that a rescheduling offers the prospect of the borrower being able to make the necessary adjustments and meet his payments in the future. Another reason is that reschedulings involve new fees and charges which are added to the borrower's loans. Also, the new higher interest rates increase the return to the lender, at least on paper. All of these benefits to the lender are weighted by the probability of the borrower being able to make his payments in the future, which is incorporated into ρ.

---

[3] This measure of risk is not exogenous but rather represents a rational expectations forecast.

An additional advantage is mostly fictional. The managers of
lending banks are able to postpone having to write off the bad loans.[*]
A bank's balance sheet is not only protected by a rescheduling, it is
actually improved: Overdue receivables are transformed into up-to-
date loans extended at higher rates of interest. In addition, revenue
has been generated from rescheduling fees. At least until the decision
is made to set aside additional reserves in the generally low
expectation of ever receiving the rescheduled payments, the profit-
loss statement will look very favorable.

Given these strong incentives to lenders to reach a rescheduling
agreement with their delinquent debtors, it is not surprising that since
1945 a formal default has actually been invoked only in a handful of
circumstances (Cuba, North Korea). And even in these cases it was at
least as much a repudiation of the obligations by the borrowers as it
was a declaration of default by the lenders.

Of the three possible outcomes (repayment as scheduled,
rescheduling, or default), the first is the most desirable from the
lender's point of view. He receives a payment valued at R. But whether
or not to make repayments as scheduled is up to the borrower, and the
lender can exert only indirect influence. Once the borrower has decided
not to make the payment as scheduled, or once it is revealed that he is
unable to make the payment as scheduled, the lender must decide whether
to call for a formal default or to negotiate a rescheduling. Of these
two choices, he clearly prefers the latter.

The Borrower's Decision

Consider a borrower who has a resource endowment equal to E. E is
assumed to be random with known expectation and variance. The borrower
is also obligated to transfer resources amounting to R to the lender.
He has a social utility function which is strictly increasing in the
amount of resources he can retain for himself. If he makes repayment R
as scheduled, his utility will be $U(E-R)$.

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[*] I am indebted to Jonathan Cave for pointing out to me that there
may be real advantages to postponing the writing off of "bad debts."
They consist primarily of improved access to assets loanable to good
borrowers. Indeed, this advantage is reinforced by discounting.

In a rescheduling, the borrower is able to exchange having to pay R now with paying (1+d)R in the future. If the borrower's social discount rate Δ is larger than d he will prefer a rescheduling[5] to making the payment R now. The borrower's return to a rescheduling is $U(E-\frac{1+d}{1+\Delta}R)$.[6]

In case of a default, the borrower sees a portion of his wealth, valued at bR, seized. However, default also entails some sanctions which are painful to the borrower, such as a boycott by major international banks, punitive tariffs, and the like. As a consequence, the borrower's net return to default is given by $U(E-bR-S/(1+\Delta))$, where $S/(1+\Delta)$ is the discounted cost of the future sanctions.

Assume that S is so large that for most borrowers the costs of a default exceed the costs of making the payment now. It is rumored that Castro, who had chosen to repudiate the obligations of his predecessor government, advised the Sandinista regime not to repudiate Nicaragua's foreign debt. If this is indeed true, Castro's hindsight lends credence to this assumption. Note also that if there are no sanctions to a default, borrowers will always choose that option.

Assume further that Δ is a decreasing function of E. If today's E is small relative to its expectation, the borrower is likely to have a high social discount rate, and vice versa. If today's endowment is relatively large, Δ is small, then U(E-R) will be larger than either of the other two possible payoffs, and the borrower will make the payment as scheduled. But as E falls (Δ rises), the payoff from rescheduling will eventually exceed U(E-R) and the borrower will refuse payment if he thinks he can get a rescheduling. As E continues to fall (Δ rises), the payoff to default will also exceed U(E-R), and the borrower will refuse payment regardless of whether he believes he will be granted a rescheduling. However his payoffs still favor a rescheduling over a default.

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[5] For simplicity, assume that the rescheduling terms d are known with certainty by everyone. Alternatively, one could assume that lenders and borrowers have the same expectations regarding d and are risk-neutral. But this would only complicate the analysis while adding little to the understanding of the basic problem.

[6] If the borrower does not intend to repay the loan in the future either, his ability will of course be equal to U(E).

The borrower cannot choose rescheduling on his own. He can only choose to pay R or not to pay. In the latter case, it is the lender's decision whether to seek a rescheduling or force a default. As outlined above, this choice poses a dilemma which is not lost on the borrower. The borrower is keenly aware of the fact that the lender has every incentive to avoid a default. The lender may threaten to foreclose, forcing the borrower to default. But once the borrower has missed the payment, it is in the lender's interest to seek a rescheduling rather than a default. As a consequence, the threat of a foreclosure is not believable, and it will not influence the borrower in his determination whether or not to make a payment. Thus, if faced with a rational lender, the borrower can force a rescheduling, his preferred outcome, by refusing to pay R.

This situation is depicted in Fig. 1. The returns to the borrower and lender respectively are given in brackets. Since for the lender the return to a rescheduling has to be weighted by the probability of actually receiving the rescheduled payments, it is lower than the return to repayment as scheduled. Accordingly, the lender prefers the first outcome. But he has no way of forcing this solution. Given the assumptions outlined in this section, the borrower prefers a rescheduling to the two other outcomes. He would prefer to pay as scheduled rather than be declared in default, but since he is aware of the fact that the lender prefers a rescheduling to a default, he is not particularly worried. By not paying, he can always force the lender to chose between a rescheduling and a foreclosure, and if the lender acts in his own self interest he will chose the rescheduling. In the terminology of game theory, rescheduling is a perfect Nash equilibrium.

ANTICIPATION, REPETITION, AND REPUTATION

The way in which the game was set up above makes the lender appear virtually powerless. The borrower can always force a solution which he prefers while the lender can only react to the borrowe.'s moves. It does not matter whether the borrower is unable to pay or just unwilling, or whether the lender knows this. In any case, the strategy that maximizes the lender's payoff is to agree to a rescheduling in case of nonpayment.

Payoffs to

Lender | Borrower

[R | U(E - R)]

BORROWER

Make payment

Refuse payment

LENDER

Reschedule

Force default

$[P \cdot R \mid U(E - \frac{1+d}{1+\Delta} R)]$

$[b \cdot R \mid U(E - bR - \frac{S}{1+\Delta})]$
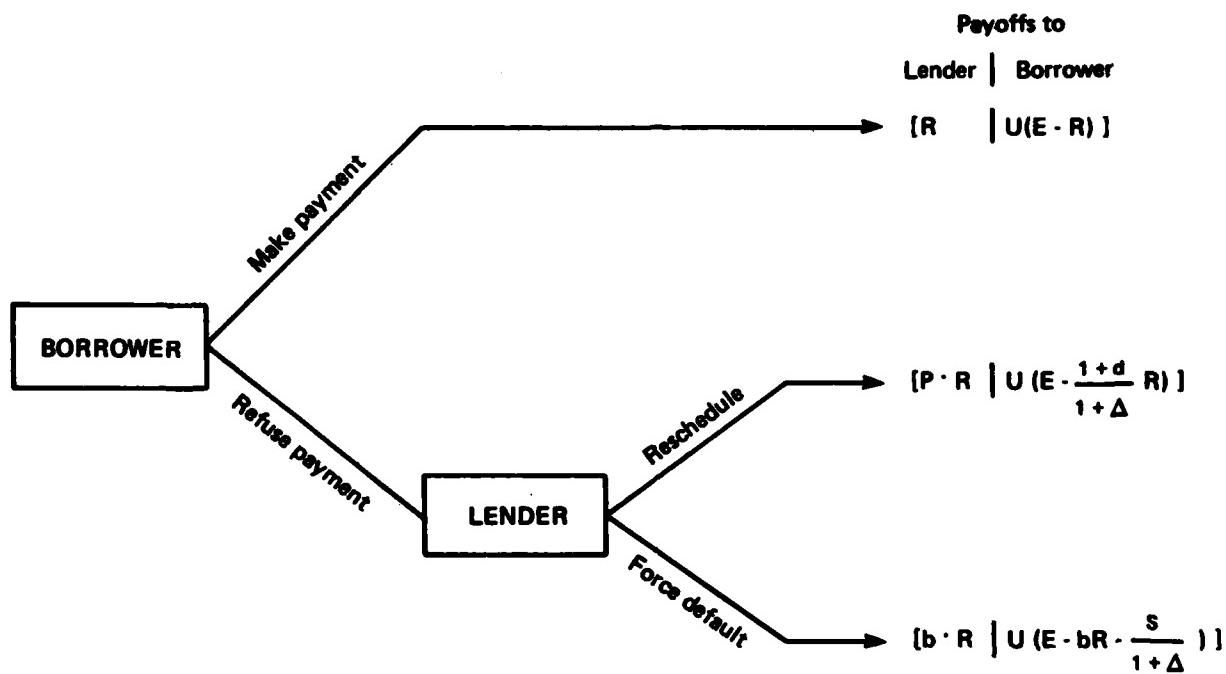
Fig. 1 — The one period stategic game

Although recent history seems to suggest that there is a lot of truth in this characterization of the international financial markets, it is certainly not a complete one. Lenders do have some power that they can exert, and they have the option of making other moves which might induce the borrower to choose to pay on time rather than taking his chances with a rescheduling or default.

Anticipatory Moves by the Lender

The lender's problem is that he cannot convince the borrower that in case of nonpayment he will indeed foreclose and force a default. But if the lender could bind himself in some way that would make it in his own interest to force a default, rather than agree to a rescheduling, he

changes of the game for the borrower. The borrower is now faced with
the option of either making the scheduled payment or facing certain
foreclosure.

Examples of such anticipatory moves are actions by the lender that
reduce the costs of a default to him. By securing collateral, for
example, the lender can increase his return (b) to default. This can be
achieved by side agreements which require the borrower to conduct some
of his business with banks or companies that are within reach of the
lender, so that any transactions balances can be seized in case of a
default.

An interesting example of this technique is provided by the private
political risk insurance industry. At least one company which insured
credits to Poland in 1980 and 1981 covered itself by having one of its
subsidiaries enter profitable joint venture agreements with the official
Polish insurance company. In this particular case, the joint venture
insured international shipping, with the American subsidiary acting as
the principal agent and thus collecting the premiums. In case of a
default on the loans insured by the political risk subsidiary, the
shipping risk subsidiary would cease transferring any premium receipts
to the Polish company and instead turn them over to the political risk
subsidiary. The important part in this arrangement is not that this
would tend to punish the borrower, but rather that it would reduce the
lender's costs of forcing a default. This particular insurance company
has suffered minimal losses from its Poland accounts.

Another, and often more effective way for the lender to convince
the borrower that he will foreclose in case of nonpayment, is to enter
into agreements which make the rescheduling option more costly to the
lender than the default option. If the borrower is aware of the fact
that in case of nonpayment it is less costly for the lender to force a
default than to agree to a rescheduling, he will be faced with a choice
between paying on time or facing foreclosure.

One such commitment is for the lender to write all the loan
contracts in such a way as to grant all borrowers identical terms. If
concessions are made to one borrower, identical concessions would have
to be made to all other borrowers as well. This would increase the
costs of a rescheduling considerably, especially for lenders who lend to

many borrowers. As a consequence, it might well be in the lender's
interest to let one borrower default, rather than to have to make
special concessions to all the borrowers.

It is important that such an agreement be irrevocable or at least
very costly to terminate. If the lender can easily back out of such an
agreement, he is not committed to forcing a default in case of
nonpayment. His implied threat to the borrower: "If you don't pay on
time we will force you into default", is no more believable than it was
before.

To become effective, such anticipatory moves need not affect the
borrower's payoff function at all. In this second example, the borrower
can be discouraged from withholding payment by an action that has
absolutely no influence on the return he gets from each possible
outcome. In the other example cited above, the borrower's payoff
function was indeed affected by the lender's action, but this is not
what made it effective. For the threat of default to be believable it
is crucial only that in case of nonpayment it is in the lender's
interest to force a default rather than agree to a rescheduling.

This result is dependent on the assumption of symmetric perfect
information. If the borrower is uncertain as to whether the lender's
payoff function favors a rescheduling rather than a default, he has to
consider the possible consequences of a default. This expected payoff
function is now a probability weighted sum of the two outcomes in case
of nonpayment, default and rescheduling. As long as the borrower
believes that there is a non-zero probability that the lender will see
it in his interest to let the borrower default rather than reschedule,
any action that raises the default cost to the borrower will lower the
expected payoff from nonpayment.

Private political risk insurers consciously use this to guard
against losses. They typically prohibit their policyholders from
disclosing the existence of the policy to the borrower. This is an
attempt to prevent the borrower from knowing the lender's payoff
function and has the effect of reducing his expected return from
nonpayment.

Repeated Plays and Reputation

The same lender may face the same borrower repeatedly over time, or face different borrowers at different times. Assume that a single borrower's strategy does not extend past one period and that the different borrowers do not cooperate.[7] The perfect information assumption assures that each time a borrower faces the decision of whether to make a scheduled payment or not, he is fully informed about all previous decisions by borrowers and lenders, as well as their consequences. Also assume that the lender's payoff function is completely known by everyone.

The tth borrower's payoff function depends on the random endowment E_t. We assume that the lender cannot distinguish between borrowers who are genuinely incapable of paying now, i.e., who would prefer default over paying and those who refuse to pay because they prefer a rescheduling, but would pay if they were certain that nonpayment would result in a default. That is, the lender cannot distinguish between borrowers who are unable to pay and those who are unwilling to pay. Given that to make such a determination the lender would have to rely on information provided by the borrower, it does not seem unreasonable to assume this slight informational uncertainty.

If a game with a single equilibrium is repeated over a known finite time horizon, it collapses back to the one period game previously analyzed. This can be seen readily by backward induction. During the last period, the borrower is facing the lender in what is in effect a one period game. Unless the lender has been able through some anticipatory moves to change his payoff function in such a way as to make default preferable to rescheduling, the borrower will be able to enforce a rescheduling. The borrower who must decide in the second to last period is aware of the fact that the lender will have to accept a rescheduling in the last period, and realizes that the lender can gain

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[7]This makes the game formally analogous to the Chain-store Paradox model in the industrial organization literature: An established monopolist faces a succession of would-be competitors. See, for example, Dixit (1982). The problem of the same borrower facing the same lender (or multiple lender) repeatedly and following a strategy extending over multiple periods is postponed for future research.

nothing by denying him a rescheduling now. Thus he will also be able to force a rescheduling. This argument can be continued until we come to the first period. The only strategic moves effective in this case are the same ones that are effective in the one period game.

If the game is played over an indefinite number of periods, the lender has an opportunity to follow strategies that deter borrowers from refusing to pay. For example, by refusing to reschedule in one period, the lender may be able to deter some borrowers whose debts become due in the future from refusing to pay. If the discounted benefit from such deterrence exceeds the loss from calling a default in the present period, the lender may see it in his interest to make some borrowers default.

Consider two pure strategies for the lender. Strategy I involves never rescheduling and strategy II involves always rescheduling in response to nonpayment. As before, consider only those borrowers for whom $\Delta > d$, those who prefer rescheduling to paying now. Under this assumption the payoffs to the lender from the two strategies are

$$PO_I = \sum_{t=0}^{\infty} \frac{R_t}{(1+r)^t} \{(1 - \pi_o) + \pi_o b\} \tag{2}$$

$$PO_I = \sum_{t=0}^{\infty} \frac{R_t}{(1+r)^t} \{\rho\} \tag{3}$$

where π_o is the probability that the borrower's endowment is so low that he prefers default to paying now, i.e., he is unable to pay.

In deriving these two payoff functions, it was assumed that b and ρ are the same in each period. π_o is the probability that a borrower will see it to be in his interest not to pay, even if he is certain that the lender will not reschedule. If borrowers are certain that the lender will reschedule, they all refuse to pay.

If $\pi_o = (1-\rho)/(1-b)$, then the lender is indifferent between the two strategies. If π_o is larger, his payoff will be larger under the second strategy and vice versa. In either case, however, it is possible that the preferred strategy is itself dominated by a mixed strategy.

If the borrowers know that with a certain probability, say α, they will be forced into default if they don't pay, their expected payoff function to not paying becomes a probability weighted sum, i.e.,

$$PO_N^B = u[\alpha(E - bR - S) + (1-\alpha)(E - \frac{(1+d)}{(1+\Delta)} R)] \qquad (4)$$

This payoff no longer clearly dominates the payoff from making the payment, and the probability that a borrower will refuse payment changes. If $\alpha=0$, i.e. the borrower is certain to receive a rescheduling, then $\pi=1$. As α increases, π falls until for $\alpha=1$, $\pi=\pi_o$.

Under a mixed strategy, the lender's payoff function becomes

$$PO_M^L = \sum_{t=0}^{\infty} \frac{R_t}{(1+r)^t} \{[1 - \pi(\alpha)] + \pi(\alpha)[(1-\alpha)\rho + \alpha b]\} \qquad (5)$$

where $\pi(\alpha)$ represents the probability that a borrower will refuse to pay, as a monotonic function of the probability that in case of nonpayment he will be forced into bankruptcy. We have $\pi(0)=1$, $\pi(1)=\pi_o$ and $\pi'<0$.

Differentiate PO_M with respect to α to find the α that maximizes the payoff for the mixed strategy. The first order condition is

$$\pi' (-1 + (1-\alpha)\rho + \alpha b) + \pi(b - \rho) = 0 \qquad (6)$$

Solving for α yields

$$\alpha = \frac{\rho-1}{\rho-b} \frac{1}{1+\frac{1}{\eta}} \qquad (7)$$

where $\eta \equiv \frac{\pi'\alpha}{\pi}$ is the elasticity of π with respect to α.

As expected, if π is not responsive to α, i.e., $\eta=0$, then the payoff is maximized at $\alpha=0$. If refusing to reschedule is not deterring any additional borrowers from nonpayment, or alternatively, if granting a rescheduling to one borrower does not induce any additional ones to refuse payment, then the lender might as well reschedule every time a borrower refuses to pay up.

If $\eta \leq (\rho-b)/(b-1)$, then it is in the lender's interest to refuse all requests for reschedulings. For values of η between this lower bound and zero, there exists an interior solution. The lender can determine an α which fixes his mixed strategy so as to maximize his payoff.

It is important that borrowers be aware of the lender's mixed strategy. They have to believe that the probability that they will be forced into default in case of nonpayment is at least equal to α. The lender can reap some additional benefits if the borrowers are under the impression that the probability of their facing default is larger than it actually is. But this is true at any level of α, and is simply the benefit which the lender derives from his superior information. But even without fooling the borrowers the lender can improve his payoff in the repeated game by moving from a pure to a mixed strategy.

The lender's reputation can be characterized by the borrower's perception of α. A reputedly "tough" lender would be one of whom it was believed that he had chosen an α close to or equal to one. A reputedly "soft" lender would be believed to have an α close to zero. This perception by the borrower may or may not be accurate.

The lender may be able to improve on his mixed strategy payoff by driving a wedge between the borrower's perception of α and the α actually chosen by the lender. The maximum payoff possible would be the one where borrowers believed α to be one while in reality it was zero. In this case only those borrowers truly unable to pay would refuse payment, and all their payments would be rescheduled. The payoff is equal to

$$PO_{Max}^{L} = \sum_{t=0}^{\infty} \frac{R_t}{(1+r)^t} \{(1-\pi_o) + \pi_o\rho\} \tag{8}$$

But if borrowers observe the lender's behavior, they will notice
that their perceptions and the lender's actions are at odds with each
other. They will update their perceived α in a Bayesian manner, and
over time their perceptions will approach reality. The lender's
reputation as a "tough guy" will be eroded.

There might be ways of slowing down this process. By widely
publicizing defaults, while keeping rescheduling arrangements secret,
the lender can attempt to influence borrower's perceptions of α in a way
favorable to him. However, this might be dangerous. If information
about the existence of a few rescheduling agreements should leak out,
the sheer fact that information had been kept from the borrowers might
lead them to believe that the practice of rescheduling is much more
prevalent than it actually is. The result would be a divergence of
perception and reality detrimental to the lender. He would seem softer
than he is.

Finally, if borrowers believe that α is positive, any increase in S
will reduce the borrower's payoff from nonpayment. Threatening larger
sanctions, especially if they are tied to an ex post determination by
the lender of whether the borrower was indeed unable, or just unwilling,
to pay, does have a deterrent effect. Of course, the borrower has to
believe that in case of default the sanctions will actually be imposed.
Given the situation in international financial markets, and the
generally competitive relationship among the major international
lenders--Western private banks and governments--the borrower might be
justified in discounting any threatened sanctions. But this raises an
entirely new game of threats, credibility, and deterence, which we shall
avoid analyzing at this time.

III. INSURANCE, CARE, AND SELF-INSURANCE

The previous section analyzed the incentives for borrowers to default under the assumption that they face a profit maximizing (loss minimizing) lender. In the case where the lender was insured, it was assumed that he, either of his own accord or under instructions from his insurer, made the proper strategic moves so as to give the borrower as much incentive as possible to honor his obligations. In other words, the interests of lender and insurer coincided, and therefore their actions vis-a-vis the borrower were identical.

This may not always be the case. If a lender is insured, he does not necessarily have an incentive to undertake actions that would lower the borrower's incentives to default. Unless the insurance company is able to dictate to the lender and observe completely his actions, he may, by acting in his own best interest, reduce the payoff to his insurer. Furthermore, it is possible that the loss to the insurer outweighs any gain by the lender, so that the combined lender plus insurer benefit is reduced.

In this section we assume that lenders are risk-neutral, i.e., they are indifferent between two opportunities of different riskiness if they have the same expected value. This is done for two reasons. First, lenders in international financial markets are usually large banking corporations. It is difficult to imagine that they could be more risk-averse than insurance companies. The concept of risk aversion, based on the principle of diminishing marginal utility of income, while intuitively straightforward and believable for individuals, probably applies to a much lesser extent to profit-maximizing corporations.[1] Second, risk aversion complicates the algebra considerably without leading to significant changes in the results. In the appendix we confirm the major results for the case where lenders are risk-averse.

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[1] Practically the only way in which one could imagine a corporate risk aversion is if certain decisionmakers within the corporation are risk averse. However, it is unlikely that this kind of principal-agent problems will lead to strongly risk-averse behavior in the market as a whole.

SELF-INSURED LENDERS

In the insurance literature a distinction is often made between "self-insurance" and "self-protection."[2] "Self-insurance" describes actions which, like market insurance, redistribute income away from the zero state toward the hazardous state. In the case considered here this would be actions aimed at limiting the losses in case of a default, such as securing collateral, monitoring loans closely, and so forth. "Self-protection" refers to actions which reduce the probability of a loss occurring. The classical example of self-protection is a lightning rod which reduces the probability of a house catching on fire due to lightning. A sprinkler system on the other hand would be considered self-insurance. A sprinkler system does little to reduce the probability of a fire breaking out, but it does limit the damage in the event of a fire. Another example would be driver's education, which is considered self-protection since it reduces the probability of an accident occurring, whereas the incremental costs of purchasing an automobile equipped with extra reinforcements to reduce injury in case of an accident would fall under self-insurance.

If this distinction seems somewhat contrived in the case of fire and casualty insurance, it is even more so in the case of insurance against nonpayment by borrowers. Many of the actions by the lender described in the previous section as reducing the borrower's incentive to default (and thus reducing the probability of nonpayment) also limit the losses in case of a default. Indeed, most of them depend for their effectiveness on this connection. Taking collateral, for example, may reduce the probability of nonpayment precisely because it lowers the lender's cost of a default.

In part this is because nonpayment risks differ from most other types of risk in a very specific way. Unlike hazards such as fire, casualty, etc., the hazard of nonpayment does not destroy wealth, it transfers it. Furthermore, the beneficiary of the transfer is largely responsible for the event of nonpayment occurring. Actions that limit the size of the transfer in case of nonpayment (i.e., self-insurance) reduce the borrower's incentives to refuse payment (i.e., have the effect of self-protection).

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[2] See, for example, Ehrlich and Becker (1972).

But actions that enhance self-protection and self-insurance are not costless. Call these actions "care," and let their cost be denoted by c. These costs are a monotonically increasing function of care so we can measure the amount of care taken by the amount c expended on it. Define the function L(c) which is the lower of either the lender's losses in case of a default or his losses in case of a rescheduling, given that he has expended the amount c on care. L(c) takes into account the effect of the lender's current decision on the probability of the future borrower's decision to refuse payment. This probability of nonpayment also depends on the amount of care taken and is given by P(c). Both P and L are declining in c.

An alternative way of taking into account the intertemporal nature of the situation would be to view the amount by which the costs of a default to the lender exceed the costs of a rescheduling as "care" that could be expended in the current period to reduce losses and the probability of their occurrence in the future. If the reduction in future expected losses is larger than c, the lender may see it in his interest to spend c, i.e., to force a default, even though this does reduce his current payoff.

In either case, the expected payoff for a risk-neutral lender is equal to

$$V = [1 - P(c)](1 - c) + P(c)[1 - c - L(c)]$$

(9)

$$= 1 - c - P(c)L(c)$$

A lender without recourse to external insurance will choose c so as to maximize (9). The first-order condition is

$$-1 - P_c L(c^*) - L_c P(c^*) = 0$$

(10)

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Multiplying (10) by c* (the optimal amount spent on care) results in

$$c^* = \left[- P_c L(c^*) - L_c P(c^*)\right] c^*$$

$$= - P(c^*)L(c^*) \left[\frac{P_c c^*}{P(c^*)} + \frac{L_c c^*}{L(c^*)}\right] \tag{11}$$

Let $P_c c^*/P(c^*) \equiv \eta_P$, the elasticity of the probability of default with respect to the amount spent on care, evaluated of c^*, and $L_c c^*/L(c^*) \equiv \eta_L$, the corresponding elasticity of the loss in case of nonpayment (11), then reduces to

$$c^* = - P(c^*)L(c^*)(\eta_P + \eta_L) \tag{12}$$

Not surprisingly, the optimal amount to spend on care depends on the size of the expected losses as well as the elasticity of P and L with respect to expenditures on care. The larger the expected loss $[P(c^*)L(c^*)]$, the higher c^*. Also, the more responsive either L and/or P with respect to c, i.e., the larger η_L and/or η_P in absolute value, the larger the optimal amount of care to be taken. Only if both L and P are not responsive to care, i.e., η_L and η_P are equal to zero, is it optimal not to take any care at all.

EXTERNAL INSURANCE

If the lender has access to external insurance, he may use it as a substitute for self-insurance and protection. The problem is not only choosing the optimal amount to spend on care, but also whether or not to purchase insurance, and if so how much.[3]

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[3] The disincentive effects of insurance coverage on care are usually called "moral hazard". See Arrow (1963), Pauly (1968), and Shavell (1979).

Let I be the fraction of a loan repayment that is insured, and i the price per insured unit. The total cost of insurance is thus iI. The insurance company offers the lender a series of i,I combinations, called policies, from which the lender chooses the one that along with the optimal amount of care taken maximizes his expected income V:

$$V = [1 - P(c)](1 - c - iI) + P(c)[1 - c - iI - (1-I)L(c)]$$

$$= 1 - c - iI -(1-I)P(c)L(c) \qquad (13)$$

In setting the price i for each I offered, the insurance company takes into account the fact that insurance tends to discourage lenders from taking care. The larger I, the smaller is the coinsurance fraction (1-I). Since a lender receives the fraction I in any case, either from the borrower or from the insurance company, only the fraction (1-I) is at risk for the lender. While the costs of care have to be borne solely by the lender, its benefit has to be divided in the proportion I and (1-I) between the insurance company and lender.

To break even, the insurance company will set i such that

$$iI = P[\tilde{c}(I)]L[\tilde{c}(I)]I \qquad (14)$$

for all I. The left-hand side of (14) represents the insurance company's revenue, while the right-hand side is its expected payout. The function $\tilde{c}(I)$ gives the optimal amount to spend on care (from the lender's point of view) given that the insurance covers the fraction I of any losses.

Note that $\tilde{c}$ is not the actual amount spent on care (c). The actual care taken cannot be observed by the insurance company, and accordingly $\partial i/\partial c=0$. However, the functions L and P are known, so the insurance company can from the first-order conditions of (13) infer $\tilde{c}$. If an individual lender with a specific I chooses a level of care $\hat{c}$ different from $\tilde{c}$, he may cause the insurance company profits ($\hat{c}>\tilde{c}$) or losses

$(\hat{c}<\tilde{c})$. In either case, however, he causes losses for himself and thus has no incentive to choose a suboptimal level of care.

Officially supported insurance is often subsidized. This is incorporated by redefining the price of insurance as $i = (1-e)i$, where $0<e<1$ is the proportion by which the insurance premiums are subsidized.

The lender's problem of maximizing his expected income while taking into account the effect that his choice of different levels of I has on i amounts to maximizing (13) subject to the constraint (14). Taking into account the possibility that the insurance premium may be subsidized, we get the first order conditions:

$$\frac{\partial V}{\partial c} = -1 - (1-I)[P_c L(\tilde{c}) + L_c P(\tilde{c})] = 0 \tag{15}$$

$$\frac{\partial V}{\partial I} = -(1 - e)i + P(c)L(c) - (1-e)I \frac{\partial i}{\partial I} = 0 \tag{16}$$

Evaluating (16) at $c=\tilde{c}$ and imposing the constraint by substituting for i and $\frac{\partial i}{\partial I}$ from (14) we get

$$\frac{\partial V}{\partial I} = eP(\tilde{c})L(\tilde{c}) - (1-e)\tilde{I}[P_c L(\tilde{c}) + L_c P(\tilde{c})]\frac{\partial \tilde{c}}{\partial I} = 0 \tag{17}$$

where $\tilde{I}$ is the optimal amount of insurance for the lender.

To solve for c we multiply (15) by $\tilde{c}/P(\tilde{c})L(\tilde{c})$

$$\tilde{c} = -(1-I)P(\tilde{c})L(\tilde{c})(\eta_P + \eta_L) \tag{18}$$

Differentiating (18) with respect to I results in

$$\frac{\partial \tilde{c}}{\partial I} = P(\tilde{c})L(\tilde{c})(\eta_P + \eta_L)$$

$$-(1-I)[P_c L(\tilde{c}) + L_c P(\tilde{c})]\frac{\partial \tilde{c}}{\partial I}(\eta_P + \eta_L)$$

$$= \frac{P(\tilde{c})L(\tilde{c})(\eta_P + \eta_L)}{1 + (1-I)[P_c L(\tilde{c}) + L_c P(\tilde{c})](\eta_P + \eta_L)} \tag{19}$$

Solving (15) for $[P_c L(\tilde{c}) + L_c P(\tilde{c})]$ and substituting into (19) results in

$$\frac{\partial \tilde{c}}{\partial I} = P(\tilde{c})L(\tilde{c})(\eta_P + \eta_L)/[1 - (\eta_P + \eta_L)] \qquad (20)$$

which is unambiguously negative.

This auxiliary result (20) reinforces the intuitively obvious point that c decreases as I increases. It calls into question the wisdom of offering insurance policies without a substantial coinsurance portion, irrespective of whether the insurance is subsidized. Many official insurers of sovereign credit risks, including the U.S. EXIM Bank, offer their exporters and lenders policies that cover 100 percent of the political risks. This tends to reduce care taken by lenders. Indeed, the sparse available data do suggest that the incidence of losses in the same markets is higher for those official insurers which provide full cover (U.S., UK, Italy) than for those that limit their coverage to 90 percent or less (Netherlands, West Germany, Japan).[4] The private political risk insurers also limit their coverage ratios to 90 percent or less, and offer substantial discounts to clients willing to accept an even higher coinsurance fraction.

Combining (17) and (20) leads to

$$eP(\tilde{c})L(\tilde{c}) = \frac{(1-e)\tilde{I}[P_c L(\tilde{c}) + L_c P(\tilde{c})]P(\tilde{c})L(\tilde{c})(\eta_P + \eta_L)}{1 - (\eta_P + \eta_L)} \qquad (21)$$

Again, after substituting for the expression in brackets from (15) and adopting the shorthand notation η for $(\eta_P + \eta_L)$, (21) reduces to

$$\frac{e}{(1-e)} = - \frac{\tilde{I}\eta}{(1-\tilde{I})(1-\eta)} \qquad (22)$$

Solving for I

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[4] See, for example, Kohler (1984).

$$I = \frac{e(1-\eta)}{(1-e)\eta} \bigg/ \frac{e(1-\eta)}{(1-e)\eta} - 1$$

$$I = 1 + \frac{\eta(1-e)}{e-\eta} \leq 1 \tag{23}$$

Not surprisingly, if insurance is not subsidized (e=0), I=0.[5]
Similarly, if η=0, i.e., if the expected losses are unaffected by the
amount of care taken, I is equal to 1 and c equal to zero (see (18)).
For all others possible values of e and η,[6] I is between zero and one.

LENDER-SPECIFIC RISKS AND RISK PERCEPTIONS

One of the major problems in international financial markets is
that the risks involved in lending are not well known. This is
especially true for political risks, which include the risks of lending
to sovereign borrowers. It is not unusual to find large disagreement on
the magnitude of the risks involved, where the risks are measured by
probability of nonpayment.

This uncertainty[7] gives rise to different risk perceptions among
lenders and insurers. If a lender perceives the risks to be higher than
the insurer does, he might be buying insurance, even if he is risk-
neutral, and the insurance is not subsidized from the insurer's point of
view.

In an insurance market with uncertainty, and the market for
international credit risk insurance certainly qualifies as such, we are
thus unable to tell very much about the lender's preferences from the
simple fact that lenders purchase insurance. They may do so because
they are risk-averse, or because they perceive the risks to be more

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[5] This is a standard result of the insurance literature.
Risk-neutral lenders have no incentive to purchase actuarially fair
insurance.
[6] Recall that $0 \leq e < 1$ and $\eta \leq 0$.
[7] Risk refers to a situation where the probabilistic distribution
of possible outcomes is known, while uncertainty refers to the situation
where the distribution is not known.

substantial than the insurer does. But this distinction is very relevant for the analysis presented here. Risk aversion often finds its expression in a more pessimistic assessment of the repayment probabilities. The behavior of a lender who is risk-averse and that of a lender whose perceptions differ from those of the insurer are indistinguishable, and unless one believes that the different perceptions extend to the assessment of the marginal efficiency of care, the results remain unchanged.

Even if lenders had different perceptions regarding the elasticities of P and L with respect to c, it is doubtful that in the long run the amount of care taken, and thus the losses, would be very different. True, in the short run, a lender who believes these elasticities to be smaller than the insurance company does would buy more insurance and take less care than the insurer expects, and thus suffer higher losses. However, in response the insurance company would certainly seek to offset its losses with an increase in premiums. This would give the lender incentive to substitute care for insurance again, bringing his losses back down closer to the social optimum.

One argument in favor of government-sponsored insurance for foreign credit risks is based on the assertion that lenders would tend to overestimate the risks involved in trade financing, and would thus make less than the socially optimal amount of funds available in an unsubsidized market. Advocates of this line of reasoning believe that the government is better able than the private market to assess the risks, and to offer insurance against them.

With respect to credits to Poland, Romania, and other Eastern Bloc countries, it is certainly not true that private lenders overestimated the risks involved. Quite the opposite. Western lenders seem to have seriously underestimated the risks of lending to the Soviet Union and its allies. In their defense, it must be added that they did so with the encouragement of Western detente politicians, and that they underestimated the risks to a considerably lesser extent than the official credit risk insurers did. Hermes in West Germany, Coface in France, and the Commodity Credit Corporation in the United States continued underwriting large new credits to Poland, Romania, and other Eastern Bloc countries long after the private insurers and uninsured lenders had withdrawn from the market.

Warning signs of the impending difficulties with loans to Eastern
Europe were manyfold and early. When Poland started to place
restrictions on the trading of its IOUs in 1979, private insurers and
uninsured lenders saw the writing on the wall and started to raise their
premiums, secure collateral, or simply withdraw from the market.
Official insurers and guarantors of foreign credit risks are unable to
react fast enough in this kind of a situation.[8]

Differences in perception of credit risks are essentially the
result of different interpretations of the same incomplete information.
It is also possible that lenders have more or different information than
insurers do, and thus correctly come to a different appreciation of the
risks.[9] More frequently, however, it is the case that different private
and public lenders and insurers face different risks, and it is possible
that some or even all of them accurately appreciate the respective risks
involved.

Private insurers of foreign credit risks state that their premiums
vary more with respect to lenders than to borrowers (Kohler and Fisher,
1983). Their experience shows that the probability of nonpayment
depends more on who is the payee than on who is the payor. Section II
provided a justification as to why borrowers take into account the
characteristics of the lender when deciding whether to make a payment.
Lenders who have a reputation for being tough, and who are in a position
to impose a large penalty on the borrower at little cost to themselves,
have a better chance of being paid on time.

Some private lenders are not in a very strong position to impose
sanctions in case of nonpayment by the borrower. This type of lender
correctly perceives that his specific default risks are quite high, and
he would be very interested in purchasing insurance coverage, even if he

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[8] Official credit risk insurers are also hampered by political
constraints, such as equal premiums for all borrowers, which compound
their difficulties. Even in those cases where they perceive the actual
risks properly, they usually face strong opposition from their own
export industries when they try to limit their exposure, such as
selectively raising premiums or refusing coverage.
[9] For a lender to withhold information pertaining to the riskiness
of the venture to be insured is fraud, and we do not consider this
possibility here.

was risk-neutral. A private insurer who realized this lender's difficulty would be reluctant to accept the cover. He might advise the lender on ways to improve his chances of being paid, and make following this advice a condition of accepting the risk. More likely, though, he would simply raise the premium, if necessary to prohibitive levels, as a polite way of saying "no."

It is possible that an insurance company might be willing to assist a client in improving his repayment chances by advising the borrower that if he failed to repay this particular loan, he would have to reckon with the insurer in addition to the original lender. This method is only effective, however, if the insurer has a special hold on the borrower, such as, for example, the joint venture agreement described in Section II. In general, most insurers recognize that they have even less influence on the borrower than the lender. This is why they usually require that the existence of the insurance contract not be disclosed to the borrower.

Official government-backed insurers tend to suffer under the misconception that they have a better chance of being repaid than the original lender does. They often accept cover at rates that are subsidized for any reasonable value of P, because they believe that the borrower would be hesitant to default to a foreign government. For the same reason they usually insist on publicizing the fact that they are covering their client's losses. This strategy backfires if the borrower expects sanctions from a foreign government to be less onerous then those a private lender might impose in case of nonpayment. Unfortunately, especially with respect to loans to the Eastern Bloc, this seems to be the case more often than not.

IV. SUMMARY AND CONCLUSIONS

Losses in international lending can be kept to zero by not lending at all. However, it is likely that this savings would be more than wiped out by the forgone benefits that normally accrue to lenders in the form of returns on their investment. Lenders thus are usually willing to incur some losses in order to make a net profit. The preceding sections have shown that by taking care, providing the right incentives to the borrowers, and purchasing insurance, losses to the lender can be reduced, albeit at a cost.

The lender maximizes his utility by choosing insurance and care so as to equilibrate their respective marginal productivities in reducing his losses. It has also been shown that if any insurance is purchased (because the lender is risk-averse, the lender perceives the expected losses to be larger than the insurer does, or the insurance policies are subsidized), this equilibrium is at a point where care is less than in the absence of insurance, and where lenders have less incentive to undertake costly strategic moves to induce the borrower to honor his obligations.

If lenders demand insurance because they are risk-averse, there exists an opportunity for private insurers to offer insurance at cost covering rates. However, the presence of government-backed competitors who face no profit constraints complicates the interpretation of data from the unsubsidized insurance market. The mere existence of an unsubsidized market for foreign credit risk insurance is not necessarily proof that private lenders are averse to credit risks (more so than private insurers are). Private lenders may purchase insurance against foreign credit risks at unsubsidized prices for a number of other reasons besides risk aversion:

1. They may do so as part of a package deal, involving all kinds of other coverages as well.
2. Some private insurers have better chances of being paid back than their clients might have, because of some specific hold they

have over the borrower (see Section III).

3. Some lenders, especially those who are active in a specific market
   for a limited time only, justify purchase of insurance on
   the basis of savings in information costs.

If the social preference function does not exhibit risk aversion,
which seems to be a reasonable assumption for the kind of risk
considered here, the social optimum would be found under a system where
insurers were free to offer insurance at rates that they considered cost
covering. Regardless of the motivations for buying insurance, the
social costs due to reduced care would be more than offset by the gain
to the individuals who find the actuarially fair insurance service
valuable. In equilibrium the level of care taken would probably
correspond closely to the level that would be reached if all lenders
were risk-neutral.[1]

Since losses on loans constitute a transfer to the borrower, he is
one of the unintended beneficiaries of the services provided by
insurers. In the case of loans to the Eastern Bloc, Western governments
could consider the option of reducing this unintended side benefit by
prohibiting the sale of any insurance on Western loans to the Eastern
Bloc, even at cost covering rates. However, such a policy would impose
social costs on the Western economies as well, especially Western
lenders, and would be nearly impossible to enforce.

On loans to the Soviet Bloc, Western governments follow quite the
opposite policy. They provide insurance and guarantees at rates that
are below comparable rates offered by private insurers (Kohler and
Fisher, 1983). The rates are consistent with expected losses
considerably below the estimates offered by private traders and bankers
(Kohler, 1984). This evidence suggests that the insurance policies
offered by the governments are subsidized (unless Western governments
have better information than the private market does), can administer

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[1] Recall that risk-averse lenders take more care than risk-neutral
ones. But if the social preference function does not exhibit risk
aversion, this level is higher than is socially optimal. The
availability of insurance lowers the level of care toward the social
optimum.

their insurance programs at lower costs, or face a lower probability of default.

If the EXIM Bank or the CCC in the United States, Coface in France, Hermes in Germany, or any other government-backed insurer of foreign credit risks had any information that might induce the private market to lower its assessment of the risks involved, they would certainly make it public. These agencies are charged by their respective governments with promoting exports. They would hardly withhold information that is likely to make businessmen more optimistic about export prospects.

It is also most unlikely that government-backed insurers are more efficient than their private sector counterparts in producing their services. They are often bound by rules of operation which increase their costs. In the United States, for example, the EXIM Bank has to undertake special efforts to assist exports by small businesses through government-backed loans and guarantees. A disproportionate share of losses accrue to this line of business (small businesses are frequently less sophisticated and have less clout in dealing with foreign borrowers), yet the rates paid by these clients are the same as for other clients. Based on information gathered from executives in private insurance companies as well as from the EXIM Bank, Kohler and Fisher (1983) estimate that the volume of insurance underwritten per employee in the foreign credit risk business is 5 to 10 times higher among private companies than among government-backed insurers.[2]

It is also most doubtful that officially backed insurers have a better chance of being paid back because the prestige and clout of the exporting government helps pressure the importers to meet their obligations. Quite the opposite is probably true. In the numerous reschedulings that have taken place, the exporting governments have time and time again proven that they are unable and unwilling to take a hard line with delinquent borrowers. They are captives of their respective exports interest to an extent that makes it very difficult for them to impose even the simplest and mildest of sanctions--refusal to back any more new loans. If a borrower knows that a specific credit is

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[2] This comparison is somewhat biased because private insurers usually require a minimum premium of about $50,000 before considering the business. They thus tend to attract large-ticket policies relative to the average policy written by official insurers.

underwritten or guaranteed by the government in the lender country (and most official insurers, in contrast to private ones, allow that this information be given to the borrower), he has every incentive to stop repayments of these loans as soon as he starts having difficulties meeting his obligations.

The conclusion is that the rates of government-backed insurers would probably have to be above the rates of the private market to reflect the true risks to the lenders and insurers. Indeed, the published accounts of official export credit risk insurers reveal that most of them are running losses, and have been doing so for quite some time. In the United States, the EXIM Bank is only solvent because bad loans were never written off (Kohler and Fisher, 1983). The Export Credit Guarantee Department in the UK essentially lives off the imputed interest on a large government endowment. Of the agencies which publish some accounting data,[3] only only Hermes in West Germany has until recently been covering its costs, and in spite of recent losses is still solvent on the strength of accumulated profits.

The subsidization of insurance rates has a number of effects on the markets for international loans. Since the costs of insurance are usually rolled into the interest rates charged, at least in part, it lowers the costs of loans to the borrower. As a consequence, it leads to an increase in the volume of lending. Furthermore, as this Note has shown, it leads to a level of care below that which would prevail in an unsubsidized market. It is also below the level that would prevail in a market where all lenders are risk-neutral, and since the level of care in such a market corresponds to the social optimum, we have to conclude that subsidizing foreign credit risk insurance leads to a suboptimal amount of care, and thus to losses higher than the socially optimal level.

This conclusion holds independently of what happens to the losses. In the specific case of losses on Western loans to the Eastern Bloc, the argument is further reinforced by the observation that the losses are not simply a destruction of wealth, but a transfer of wealth to a

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[3] Many governments exempt their official export credit insurers from the usual commercial reporting requirement, or even prohibit publication of any financial data that would allow assessing the financial health of the insurer.

strategic adversary. This unintended side effect could be justified in the case of cost covering insurance rates by increases in domestic social welfare. But under subsidized insurance rates, these increases have been changed into decreases in welfare, compounding the problem.

APPENDIX: RISK AVERSION

Assuming lenders in international financial markets lending to sovereign borrowers to be risk-neutral is certainly not a far-fetched idea. It is difficult to envision how an institution such as Citibank, Chase, or any other major bank could be more risk-averse than a large insurance company. Furthermore, the practice of syndicating and factoring of loans offers bankers almost unlimited opportunities for spreading their risks and balancing their portfolios. What is unusual about the analysis presented here is that such lenders are considered potential purchasers of insurance.

As has been shown, however, risk-neutral levelers purchase insurance only if it is subsidized. The fact that large corporations which would normally be considered risk neutral are among the clients of official foreign credit risk insurers could thus in itself be interpreted as evidence of the existence of subsidies in these policies. If these lenders are competitive, and the evidence suggests that competition among lenders in international financial markets is quite fierce, this subsidy benefits primarily the borrowers in these markets.

We normally think of insurance as a means by which risk-averse agents can protect themselves against the losses in utility due to fluctuations in income. For risk-averse individuals, expected utility is not proportional to expected income. They maximize their expected utility by maximizing

$$EU = [1 - P(c)]U[1 - c - (1-e)iI]$$
$$+ P(c)U[1 - c - (1-e)iI - (1-I)L(c)]$$
(A.1)

where EU is expected utility, and the U[ ] are regular utility functions in one variable (income) with $U'<0$ and $U''\geq0$.

Shavell (1979) has analyzed this problem under a number of alternative assumptions regarding the insurers' ability to observe care. His analysis is generalized here by making the insurance payout a fraction of the loss and the size of the loss dependent on care. As a consequence, the insurance payout is also dependent on care.

Furthermore, it is assumed that care taken cannot be observed. These assumptions reflect the circumstances of international credit insurance more accurately.

The first-order condition for the optimal amount of care is:

$$\frac{\partial EU}{\partial c} = -P_c U_o - [1 - P(\tilde{c})]U_o' \qquad (A.2)$$
$$+ P_c U_1 + P(\tilde{c})U_1'[-1 - (1-\tilde{I})L_c] = 0$$

Rearranging the terms of (A.2) we get

$$P_c(U_1 - U_o) - P(\tilde{c})U_1'(1-I)L_c = [1 - P(\tilde{c})]U_o' + P(\tilde{c})U_1' \qquad (A.3)$$

The left-hand side of (A.3) corresponds to the marginal benefit of taking care. It consists of the marginal reduction in the probability of suffering a utility loss amounting to $(U_1 - U_o)$ and the probability weighted improvement in the marginal utility due to the reduction in the size of the loss in case of nonpayment. The right-hand side represents the costs of taking care, measured in utility units.

As before, we can solve for $\tilde{c}_{RA}$, the optimal amount of care under risk aversion, by multiplying (A.3) by $c/P(\tilde{c})L(\tilde{c})$. After some manipulations

$$\tilde{c}_{RA} = \frac{P(\tilde{c})L(\tilde{c})\left[\dfrac{U_1-U_o}{U_1'L(\tilde{c})}\, \eta_P - (1-\tilde{I})\eta_L\right]}{[1-P(\tilde{c})]\, \dfrac{U_o'}{U_1'} + P(\tilde{c})} \qquad (A.4)$$

Under risk-neutrality, $U_o'=U_1'$, and thus $U_1-U_o=-(1-I)L(\tilde{c})U_1'$. In this case, not surprisingly, (A.5) reduces to (18).

For risk-averse lenders, the optimal amount of care to be taken is larger than for risk-neutral ones. Observe that for $U_o'<U_1'$ (declining marginal utility, risk aversion)

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$$U_1-U_o > -(1-I)L(\tilde{c})U_1' \qquad (A.5)$$

so that

$$\frac{U_1-U_o}{U_1'L(\tilde{c})} > -(1-I) \qquad (A.6)$$

Also note that in this case $[1-P(\tilde{c})]U_o'/U_1' + P(\tilde{c}) < 1$. It follows immediately that for the same level of I, $\tilde{c}_{RA}>\tilde{c}_{RN}$. As a corollary, note that $P(\tilde{c}_{RA}) \leq P(\tilde{c}_{RN})$ and $L(\tilde{c}_{RA}) \leq L(\tilde{c}_{RN})$. The equal sign applies when $\eta_P=\eta_L=0$. In the general case, risk-averse lenders take more care and thus suffer smaller losses than risk-neutral ones.

Ehrlich and Becker (1972) have shown that for large Ps it is not necessarily true that $\partial \tilde{c}/\partial I \leq 0$. This is due to the effect of c on P, what Ehrlich and Becker call self-protection. Expenditure on self-protection reduces income in both states directly. Thus with U concave, the difference between U_o and U_1 is increased. Care also increases income indirectly, through its effect on i. If P is large, it is possible that with external insurance available, the optimal amount of care is increased. This implies that at least over some ranges of I, $\partial \tilde{c}_{RA}/\partial I$ may be positive.

In the case considered here, however, it is most unlikely that the conditions for such a counter-intuitive result are satisfied. First and foremost, P is very small in international sovereign lending, nowhere near the 0.5 level which Ehrlich and Becker use as an example. Second, risk aversion is probably quite small, so that U is not very concave. The conclusion is that $\partial \tilde{c}_{RA}/\partial I$ is in all likelihood less than zero, even if lenders are risk-averse.

The first-order condition for the optimal amount of insurance coverage is:

$$\frac{\partial EU}{\partial I} = P_c \frac{\partial \tilde{c}}{\partial I} [U_1 - U_o]$$

$$- \frac{\partial \tilde{c}}{\partial I} [(1 - P(\tilde{c}))U_o' + P(\tilde{c})U_1' + P(\tilde{c})U_1'(1-I)L_c]$$

$$- (1-e)i'\tilde{I}[(1 - P(\tilde{c}))U_o' + P(\tilde{c})U_1']$$

$$- (1-e)i[(1 - P(\tilde{c}))U_o' + P(\tilde{c})U_1']$$

$$+ P(\tilde{c})L(\tilde{c})U_1' \qquad = 0 \qquad\qquad (A.7)$$

The first two lines in (A.7) are familiar (see (A.3)). They refer to a change in utility due to a change in the probability of a loss and a chang in the amount spent on care plus a change in the size of a loss, respectively. At the optimum, where (A.3) holds, they are offsetting.

The next two lines, 3 and 4, refer to changes in the cost of insurance. Line 3 gives the effects on expected utility of a change in the price of insurance while line 4 gives the change due to the increased quantity of insurance purchased. At the optimum, the sum of these two effects must equal the increased benefits of insurance (line 5). The first-order condition for the optimal amount of insurance reduces thus to

$$P(\tilde{c})L(\tilde{c})U_1' = [(1 - P(\tilde{c}))U_o' + P(\tilde{c})(U_1')](1-e)[i'I + i] \qquad (A.8)$$

Solving (A.8) for I is quite tedious, primarily due to the difficulty involved in evaluating of $i'=\partial i/\partial I$. This derivative depends on the insurer's evaluation of $\partial \tilde{c}/\partial I$, the extent to which changes in I affect the lender's optimal level of care. Referring back to (A.4), one notes that this expression, among other things, depends on the degree of risk aversion.

It is probably not unreasonable to assume that initially at least insurers calculate i under the assumption that their clients are risk-neutral. As pointed out above, while some purchasers of insurance may be risk-averse, it is unlikely that the large financial institutions which account for most of the international lending are highly risk-averse. The average degree of risk aversion is probably quite small. Furthermore, the insurer is unable to observe the utility function of the insured, thus he does not know the extent of this client's risk aversion.

Under these circumstances, it is a conservative pricing policy for the insurer to assume risk-neutrality on the part of his clients. If lenders are risk-averse and thus take more care for the specific insurance policy chosen than what the insurer expected, the insurance company's profits are increased.

If the insurance policies are offered by an official insurer operating under a zero profit constraint or by competitive individual firms, one would expect such profits to be eroded over time. In the long run, the policies offered would reflect the average degree of risk aversion. Since risk-averse lenders take more care than risk-neutral ones, for every level of I it follows that in the long run i_{RA} would be lower than the initial i that was calculated by the insurer assuming risk-neutrality. Accordingly, the $\tilde{I}_{RA}$ that is calculated for the case where insurers base the policy schedules they offer on the assumption of risk-neutrality is a lower bound and may increase in the long run.

If the lender constructs the schedule of policies he offers assuming risk neutrality, (15) and (20) result in:

$$i' = \frac{\partial i}{\partial I} = [P_c L(\tilde{c}) + L_c P(\tilde{c})] \frac{\partial \tilde{c}_{RN}}{\partial I}$$

$$= \frac{[P_c L(\tilde{c}) + L_c P(\tilde{c})] P(\tilde{c}) L(\tilde{c}) \eta}{1 - \eta}$$

$$= - \frac{I_{RN} \eta}{(1-I)(1-\eta)} \qquad (A.9)$$

Substituting (A.9) into (A.8) and rearranging terms yields:

$$\frac{U_1' P(\tilde{c}) L(\tilde{c})}{[(1-P(\tilde{c}))U_0' + P(\tilde{c})U_1']} = (1-e) i_{RN} \cdot \left[1 - \frac{\tilde{I}_{RA} \eta}{(1-\tilde{I}_{RA})(1-\eta)} \right] \qquad (A.10)$$

Therefore

$$\frac{\tilde{I}_{RA}}{(1-\tilde{I}_{RA})} = - \left\{ \frac{U_1' P(\tilde{c}) L(\tilde{c})}{[(1-P(\tilde{c}))U_0' + P(\tilde{c})U_1'](1-e) i_{RN}} - 1 \right\} \frac{(1-\eta)}{\eta} \qquad (A.11)$$

Note that $I/(1-I)$ is monotonically increasing in I. Furthermore note that under risk-neutrality,[1] the expression in brackets reduces to $e/(1-e)$. (A.11) is thus equivalent to (14).

To show that $I_{RA} > I_{RN}$, we would have to show that the expression in brackets is larger than $e/(1-e)$. This is equivalent to showing that

$$\frac{U_1' P(\tilde{c}) L(\tilde{c})}{[(1-P(\tilde{c})) U_o' \eta + P(\tilde{c}) U_1'](1-e) i_{RN}} > \frac{1}{(1-e)}$$

or

$$U_1' P(\tilde{c}) L(\tilde{c}) > [(1-P(\tilde{c})) U_o' + P(\tilde{c}) U_1'] i_{RN} \qquad (A.12)$$

Under the current assumptions this is ambiguous. The expression in brackets on the right-hand side is clearly smaller than U_1, but the expected losses per unit insured under risk aversion $[P(\tilde{c}) L(\tilde{c})]$ are smaller than i_{RN}, which is equal to the expected losses per unit under risk-neutrality. However, as pointed out above, if the insurance companies are competitive or operate under a zero profit constraint, the insurance premium charged to risk-averse lenders will fall over time, and (A.12) will hold unambiguously.

If (A.12) holds, the effect of changes in e onto $\tilde{I}_{RA}$ are the same as in the case of risk neutrality. This leaves the main result from the analysis of the risk-neutral case unchanged: Subsidizing insurance tends to lead to increased purchases of insurance and thus to a reduction in the amount of care taken, provided P is not very large.[2] However, risk-averse lenders will take more care for every level of I

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[1]Under risk-neutrality, $U_o' = U_1'$.

[2] See p. 38.

than risk-neutral ones. Conditional on I, expected losses are thus smaller under risk aversion than under risk neutrality.

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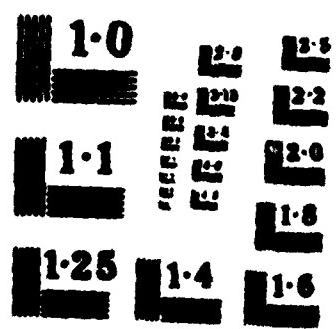
SUPPLEMENTARY

INFORMATION

October 12, 1984   ERRATUM

N-2117-USDP   Incentives and Insurance in International Financial
                Markets

Page No.
  12   Fig. 1, the expression beginning $[P \cdot R$ . . . should read
                $[\rho \cdot R$ . . .

  13   First line: delete of

  26   Equation 22: the expression $I\eta$ should read $\check{I}\eta$
                The next line: Solving for I should read Solving for $\tilde{I}$

  23   Fourth line of text: I should read $\bar{I}$

  40   Equation A.8: the expression $i'I$ should read $i'\tilde{I}$

  41   Last line of text before equation A.9: Insert (14), before
                (15)

  41   Equation A.9: after the last = sign, $I_{RM}\eta$ should read
                $i_{RM}\eta$ in the numerator; in the denominator, add an ~ over
                the I